Diet & Physical Activity in Cancer Prevention & Survivorship: The Science and Practice

May 15, 2012
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~ Part Two ~

Nutrition & Physical Activity to Reduce Cancer Risk & Recurrence:
Recommendations and their Implementation
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Nutrition Advisor, AICR

Weight & Physical Activity

RECOMMENDATION:
Be as lean as possible without becoming underweight.

Normal Weight Obesity

- BMI < 25 BUT
- Body fat > 30-33% in women or > 20-25% in men

- Metabolic syndrome: almost 4x incidence
- CV mortality in women: more than 2x higher
- Insulin resistance
- Inflammatory cytokines (TNF-α, IL-6)

Recommended Waist Size Targets

Men < 37 inches
Women < 31.5 inches

Romero-Corral, Eur Heart J 2010 (NHANES III);
Di Renzo, Obesity 2010.
RECOMMENDATION:
(to promote a healthy weight)

- Avoid sugary drinks
- Limit consumption of energy-dense foods
- Consume “fast foods” sparingly, if at all

Two strategies for eating 1575 kcal a day

Food ED = 2.3
Food ED = 0.52

For Systematic Review Energy Density & Weight: Pérez-Escamilla, J Acad Nutr Diet 2012

Calorie Density in Self-Selected Diets over 6 Years

<table>
<thead>
<tr>
<th>Diet Level</th>
<th>Calories</th>
<th>Energy Density</th>
<th>Weight Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low CD</td>
<td>1022 g</td>
<td>1514 kcal</td>
<td>+ 5.5 lbs</td>
</tr>
<tr>
<td>Med CD</td>
<td>864 g</td>
<td>1659 kcal</td>
<td>+ 10.6 lbs</td>
</tr>
<tr>
<td>High CD</td>
<td>751 g</td>
<td>1737 kcal</td>
<td>+ 14.1 lbs</td>
</tr>
</tbody>
</table>

Savage, AJCN 2008

Low Calorie Density in Practice

- Limit added fats and high-fat foods
  * Moderate amounts of oils & nuts as part of a healthy diet are not linked to weight gain
- Use vegetables and fruits to replace some foods high in energy density
  * Mainly low energy-dense produce
  ** Most powerful step?

Blatt, Am J Clin Nutr 2011
Rolls, J Amer Diet Assoc 2005
Ledikwe, Am J Clin Nutr 2006

Reducing Calorie Density & Portions to Reduce Calorie Consumption

<table>
<thead>
<tr>
<th>Average Kcal Intake per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% Ed + Portion</td>
</tr>
<tr>
<td>100% Ed, 75% Portion</td>
</tr>
<tr>
<td>75% Ed, 100% Portion</td>
</tr>
<tr>
<td>75% Ed &amp; Portion</td>
</tr>
</tbody>
</table>

(Rolls, AJCN 2006, 83:11)

RECOMMENDATION:
Be physically active for at least 30 minutes every day
Diet & Physical Activity in Cancer Prevention & Survivorship: The Science and Practice

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Recommendations

- At least 30 minutes moderate activity every day (such as brisk walking)
- Work up to at least 60 minutes moderate or 30 minutes vigorous activity daily
- Limit sedentary habits such as watching TV

New Focus: Nonexercise Activity (NEAT)

- Weight & Waist
- Insulin resistance
- Inflammation

Impact

- 2-2.5 x CVD/CAD mortality
- Cancer risk?
  Colon, Endometrial, Ovarian, Prostate

Lynch, CEHP 2010, 19:2691;
Hamilton, Diabetes 2007, 56:2655;
Healy, Eur Heart Jnl 2011, 32:590

Key Messages about Activity

- It's not just for weight control
- Can be 10- to 15-minute blocks
- Address frequency & compensation
- Identify structure & sources to support
- Limit super-sedentary TV / screen time
- Find ways to add small bits of movement throughout the day

Dietary Strategy: Putting Together the Pieces

RECOMMENDATION:

Eat more of a variety of vegetables, fruits, whole grains and legumes such as beans

The Microbiome:

Healthy microbiota:
- Promotes normal colon cell development
- Produces nutrients & available phytochemicals (butyrate, lignans, ITC, urolithins, CLA)
- Prevents overgrowth of pathogens
- Stimulates intestinal immunity, preserves mucosal barrier

Dysbiotic microbiota:
- Inflammation
- Obesity
Dietary Fiber & Colorectal Cancer Risk

**Summary effect:** 10% decrease risk per 10-g increase dietary fiber

<table>
<thead>
<tr>
<th>Study</th>
<th>Relative risk (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kettel 2004</td>
<td>1.02 (0.85 to 1.23)</td>
</tr>
<tr>
<td>Nakamura 2000</td>
<td>0.87 (0.71 to 1.08)</td>
</tr>
<tr>
<td>Schütz 2000</td>
<td>0.99 (0.87 to 1.13)</td>
</tr>
<tr>
<td>Mattick 1997</td>
<td>0.95 (0.83 to 1.10)</td>
</tr>
<tr>
<td>Weizmann 2004</td>
<td>0.90 (0.76 to 1.09)</td>
</tr>
<tr>
<td>Shear 2000</td>
<td>0.82 (0.65 to 1.11)</td>
</tr>
<tr>
<td>Sisto 2000</td>
<td>0.82 (0.74 to 1.00)</td>
</tr>
<tr>
<td>Bingham 1980</td>
<td>0.67 (0.51 to 0.92)</td>
</tr>
<tr>
<td>lac 2009</td>
<td>0.98 (0.74 to 1.33)</td>
</tr>
<tr>
<td>Wichmann 2001</td>
<td>0.94 (0.70 to 1.30)</td>
</tr>
<tr>
<td>Wichmann 2001 (2nd study)</td>
<td>0.93 (0.90 to 1.00)</td>
</tr>
<tr>
<td>Sarıhan 2010</td>
<td>0.99 (0.73 to 1.43)</td>
</tr>
<tr>
<td>War 2002</td>
<td>0.99 (0.73 to 1.43)</td>
</tr>
<tr>
<td>Troy 2001</td>
<td>1.00 (0.79 to 1.27)</td>
</tr>
<tr>
<td>Patterson 1998</td>
<td>0.94 (0.64 to 1.39)</td>
</tr>
<tr>
<td>Overall</td>
<td>0.93 (0.86 to 1.01)</td>
</tr>
</tbody>
</table>

**Key Message:** Eat More & Eat More Variety

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**Whole Grains**

More than Refined Grain + Fiber

Colorectal Cancer Risk & Whole grains:

3 servings/day linked to 21% lower risk

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**Interpreting Mixed Results**

- Defining significant categories
- Range of consumption
- Bioavailability
- Individual differences (genetic, diet, lifestyle)
- Compliance

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**Impact of Compliance**

Colorectal Adenoma Recurrence
US Polyp Prevention Trial

<table>
<thead>
<tr>
<th></th>
<th>RR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total study</td>
<td>1.00</td>
<td>(0.90 - 1.12)</td>
</tr>
<tr>
<td>“Super Compliers”</td>
<td>0.65</td>
<td>(.47 - .92)</td>
</tr>
</tbody>
</table>

Schatzkin, NEJM 2000
Sansbury, Am J Epid 2009

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**Legumes**
- Fiber
- Resistant Starch
- Folate
- Flavonoids
- Lignans

**At least 5 servings of non-starchy vegetables & fruits daily**
- Relatively unprocessed grains &/or legumes with every meal
- Limit refined starchy foods

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**Does sugar feed cancer?**

Cancer
- Direct impact on cancer cells??
  - Misinterpretation of current research
- AICR “avoid sugary drinks” – weight impact

Insulin effect?
- Substituted for starch, 5-35% of kcals, seems no impact in diabetes

*(Franz, JADA 2011)*

**RECOMMENDATION:**

Limit red meat and avoid processed meat

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**Red Meat and Colorectal Cancer**

Summary Estimate: 17% increased risk per 100 g/day

AICR/WCRF CUP Colorectal cancer report 2010; Chan 2011, PLOS One

**Red Meat**
- Convincingly increases risk: colorectal cancer
- Limited evidence increased risk: lung, esophagus, pancreas, endometrium
- Recommendation: No more than 18 ounces/week (Beef, Lamb & Pork)
**Processed Meat**

- Convincingly increases risk: colorectal cancer  
  18% increase in risk per daily 50 g
- Limited evidence increased risk: esophagus, lung, stomach, prostate
- Avoid (minimize)

**Processed Meat Questions**

- Nitrites
- Heme iron
- Curing & Smoking
- Grilling & Frying

**Seafood**

- For heart health  
  > 8 oz / week  
  Preferably oily fish
- For cancer prevention  
  Evidence too limited for conclusion

**RECOMMENDATION:**
Limit consumption of salty foods and foods processed with salt (sodium)

- Limit processed foods with added salt
- Sodium intake < 2.4 g per day

**What about salt?**

**Probably Increases Risk:**
- stomach cancer

Lab evidence:  
- damage stomach lining
- increase NOC production
- ? H. pylori relationship

**Increase use of herbs and spices**
“But I don’t use much salt!”

Naturally Occurring
Processed food

NHANES 2003-2004

**RECOMMENDATION:**

If consumed at all, limit alcoholic drinks to 2 for men and 1 for women a day.

One “drink” equals

- 5 ounces of wine
- 12 ounces of beer
- 1½ ounces of 80 proof liquor

Cancers Associated with Alcohol Consumption

**Convincingly Increases Risk:**
- colorectal (men)
- breast (pre- and post-menopausal)
- mouth, larynx, pharynx, esophagus

**Probably Increases Risk:**
- colorectal (women)
- liver

Alcohol & Breast Cancer Risk

- **AICR/WCRF CUP Meta-analysis**
  per 10 gm/day EtOH
  8% increase post-menopausal breast cancer

- **Million Women Study**

  compared to 0-2 drinks/week
  3-6 drinks: 8% increased breast cancer
  7-14 drinks: 13% increased breast cancer
  ≥15 drinks: 29% increased breast cancer

- **Nurses’ Health Study***

  per 10 gm/day EtOH (cumulative) 10% incr risk

Diet Acts Throughout the Cancer Process

- DNA Damage & Repair
- Inflammation
- Hormones & Growth Factors
- Epigenetics
- Gut Microbiota

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• Reach and maintain a healthy weight
• Physical activity ≥ 30 minutes/day
• Abundance and Variety: Vegetables, Fruits, Whole Grains & Beans
• Limit Red Meat
• Avoid Processed Meat
• Limit Sodium and Alcohol

Prevent about 1/3 of U.S. most common cancers
(WCRF/AICR, Policy and Action for Cancer Prevention, 2009)

Questions We Are Often Asked: What about “the extras”?
• Culinary spices?
• Flaxseed?
• Probiotics?
• Green tea?

Tea: Green & Other
Polyphenols: EGCG, Thearubigans, Theaflavins

Lab: Decrease free radicals
Increase Phase 2 enzymes (deactivation)
Change cell signaling pathways to decrease proliferation, increase apoptosis

Human: Increase antioxidant capacity
Possible Links to decreased prostate, colon, pancreas, lung, ovarian, endomatrial Breast???
Variation with population, smoking, tea preparation, amount
Don’t count on bottled ready-to-drink tea

Important Questions

SPECIAL RECOMMENDATION
FOR CANCER SURVIVORS:
After treatment, cancer survivors should follow the recommendations for cancer prevention.
All cancer survivors to receive nutritional care from an appropriately trained professional.

RECOMMENDATION:
Don’t use supplements to protect against cancer.
• In some dietary or health circumstances supplements may be valuable.
• Supplements are not recommended for cancer prevention

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All-Cause Mortality & Serum Selenium in NHANES

Rayman, Lancet 2012

Vitamin D Under Close Watch

Laboratory evidence:
• promotes cell differentiation
• reduces inflammatory cytokines
• inhibits proliferation
• stimulates apoptosis

Population studies: (low vs high blood levels)
• higher incidence of colon cancer
• effects inconsistent… eg. breast cancer

Toner, JADA 2010; Chen, Brst Ca ResTtmt 2010; Yin, Eur J Ca 2010

What Do We Tell Survivors?

Conclusions of One Recent Review:
• Possible decrease in mortality with Vit D (but how much? for whom?)
• Prudent to avoid excess folic acid (how much is too much?)
• MVI not necessarily helpful, might promote progression prostate cancer
• Don’t count on antioxidant supplements

(Giovannucci, J Clin Oncol 2010, 28:4081)

Sharing the Message

Five Steps to Build Self-Efficacy

✓ Set realistic goals to build a history of success
✓ Identify specific small steps
✓ Encourage self-monitoring
✓ Give positive feedback
✓ Share stories

What are the Barriers?
The New American Plate

\( \frac{2}{3} \) (or more) vegetables, fruits, whole grains, and beans
\( \frac{1}{3} \) (or less) animal protein

Barrier: Perception of Lack of Flavor
- Cooking methods: stir-fry, steam, roast, grill
- Herbs, spices, garlic, juices, citrus rind, ginger, vinegars
- Small additions: dried fruits, nuts, grated cheese

Barrier: Perception of Time Demand
- Simple additions: vegetables / more vegetables
- Substitutions: whole grains for refined poultry, seafood or beans for red meat

Barrier: Perception of High Cost
- Reduce high-cost, low-nutrient choices: soft drinks, “snack foods”
- Less meat, more vegetables & beans
- Fewer processed convenience foods
- Look beyond “healthy” labels
- Reduce over-buying

AICR Guidelines
- Choose mostly plant foods, limit red meat & avoid processed meat
- Be physically active every day in any way for 30 minutes or more
- Aim to be a healthy weight throughout life
**Reference Reports**

- **AICR Expert Report**
  - (Food, Nutrition, Physical Activity and the Prevention of Cancer, 2007)
- **Continuous Update Project Reports**
  - www.dietandcancerreport.org
- **American Cancer Society Guidelines on Nutrition and Physical Activity for Cancer Prevention**
- **American Cancer Nutrition and Physical Activity Guidelines for Cancer Survivors**
- **Annual Report to the Nation on the Status of Cancer, 1975-2008**
  - http://www.cdc.gov/cancer/dcpc/research/articles/am_7508.htm

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**Resources from AICR**

- **Recommendations for Cancer Prevention**
- **Guidelines to Reduce Your Cancer Risk**
  - http://www.aicr.org/reduce-your-risk
- **New American Plate**
  - http://www.aicr.org/new-american-plate/
- **AICR Publications**
  - http://www.aicr.org/publications/
- **From the AICR Test Kitchen**
  - http://preventcancer.aicr.org/site/PageServer?pagename=reduce_diet_recipes_test_kitchen&category=test_kitchen&20110809&mjm
- **Health-e-Recipes**
  - http://preventcancer.aicr.org/site/PageServer?pagename=her_current_issue
- **AICR's Foods that Fight Cancer**
  - http://www.aicr.org/foods-that-fight-cancer/